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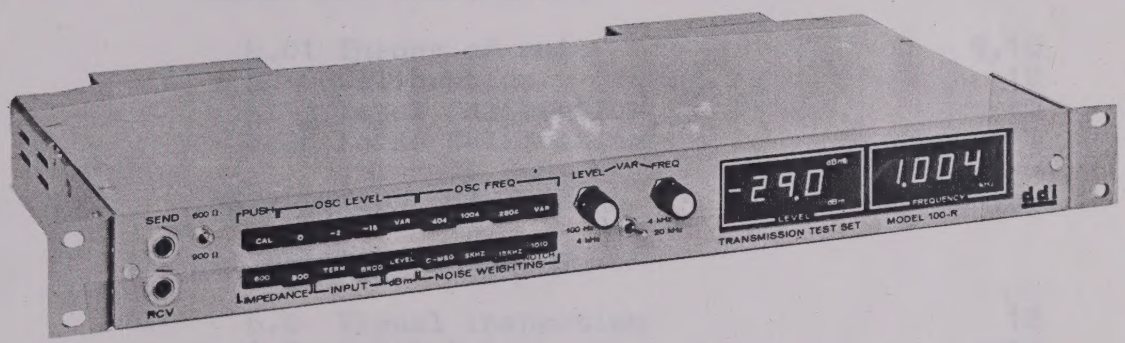
TRANSMISSION/NOISE TEST SET

MODELS 100R 100A

SERVICE MANUAL



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	Display board	23
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SCHEMATIC DIAGRAMS

DRAWING NUMBER	TITLE	SHEET
100R-SD1	Analog	1 of 4
100R-SD2	Digital	2 Of 4
100R-SD3	Oscillator	3 of 4
100R-SD4	Power Supply	4 of 4
100A-SD1	Aisle Display Card	1 of 1

COMPONENT LOCATION

DRAWING NUMBER	TITLE	SHEET
100R-CL1	Mother Board	1 of 3
100R-CL2	Oscillator Board	2 of 3
100R-CL3	Display Board	4 of 3
100A-CL1	Display Card	1 of 1

SECTION 1

GENERAL INFORMATION

1.0 GENERAL DESCRIPTION

1.01 The Model 100R Transmission/Noise Test Set provides accurate measurements of level, noise, and frequency, while being able to send sinewave signals from a wide-bank audio oscillator that is independent of the measuring circuits. The design employs advanced technologies, and places prime emphasis on high reliability, simplicity of operation, and low power consumption.

1.02 The level receiver input circuits provide for terminated or bridging measurements (600 or 900 ohms, pushbutton selectable). Autoranging provides a -50 to -10 dBm level measurement range without manual switching. A separate frequency readout provides a simultaneous display in kHz (with autoranging) of the level being measured.

1.03 Noise measurements are made using the same circuits and displays employed for level measurements, and provide a range of 0 to 60 dBrn with autoranging. The frequency display is blanked for noise measurements. Pushbutton selection is provided for C message, 3 kHz flat, and 15 kHz flat noise filters, and also a 1010 Hz noise notch filter.

1.04 The audio oscillator provides 3 pushbutton-selectable preset test frequencies and levels, plus variable controls that provide a range of 100 Hz to 20 kHz for frequency, and -40 to +10 dBm for level. A CAL pushbutton enables a direct metallic loop to be made between the oscillator and the receiver input.

1.05 The Model 100R is inspected both mechanically and electrically prior to shipment. The unit operates from a -48 VDC supply, and is also available as an option for operation from a 115/230 VAC source. The unit occupies only 1-3/4 inches of rack space (1 rack space) in a 19 or 23 inch rack.

1.06 SPECIFICATIONS

1.07 The specifications for the Model 100R are as noted in section 2 of this manual.

SECTION 2

SPECIFICATIONS

2.1 The specifications for the Models 100R, 100A, 100A-1 are as follows:

Table 2-1. Overall Specifications.

LEVEL:	
Input Range:	-50 to ±10 dBm (autoranging)
Resolution:	0.1 dB
Frequency Response:	±0.1 dB, 100 Hz to 20 kHz
Sampling Rate:	5 times per second
Detection Method:	full-wave averaging
Accuracy:	±0.1 dB -50 to +10
Blanking:	+ sign for overrange - sign for underrange (digits are blanked in both cases)
Damping:	similar to analog meters
FREQUENCY MEASUREMENTS:	
Range:	Autoranging with two ranges: Below 100 Hz to 9.999 kHz, 9.99 kHz to 50 kHz
Display:	Four-digit .43" LED, displays
Sampling Rate:	5 times per second
Accuracy:	1 count (LSD)
Resolution:	1 Hz or 10 Hz Autoranging

Table 2-1 (Cont'd)

NOISE:	
Input Range:	0 dBrn to 60 dBrn
Resolution:	1 dB
Noise Filters:	'C' message, 3 kHz, 15 kHz and 1010 noise notch (standard) 15 kHz is replaceable if desired
Detector:	Quasi RMS
Accuracy:	± 1 dB from 10 dBrn to 60 dBrn
Reading Update Rate:	2 1/2 times per second
Blanking:	+ sign for overrange - sign for underrange (digits are blanked in both cases)
Frequency Display:	Automatically blanked in noise position
OSCILLATOR:	
Frequency Range:	Variable from 100 Hz to 20 kHz in two ranges: 100 Hz to 4 kHz, and 4 kHz to 20 kHz
Programmed Frequencies:	Up to 3 within the oscillator range. Standard frequencies supplied are 404, 1004, 2804 Hz
Level Range:	From -40 to +10 dBm
Programmed Levels:	Up to 3 and variable. Standard levels are 0, -2, and -16 dBm
Level Variation:	± 0.1 dB, 200 Hz to 20 kHz
Cal Send Key:	Loops oscillator to the level noise input direct metallic

Table 2-1 (Cont'd)

Line Holding Circuit	active circuit; 30 mA nominal (holds line while cal send is pushed or normal)
Harmonic Distortion	1% total, 100 Hz to 20 kHz Less than 0.5% at 1004 Hz
Output Impedance:	600 or 900 ohms balanced

GENERAL:

Selectable Input:	600 ohms or 900 ohms, terminated or bridging
Bridging Loss:	Less than 0.2 dB
Reading Response:	Similar to analog meters
Audio Monitor:	Level or noise, rear access wiring option
Input Power:	-42 Vdc to -52 Vdc
Current Drain:	225 mA nominal at -48 Vdc
Optional AC Option:	115/230 VAC ±10%, 50 to 400 Hz, 15 Watts
Power ON/OFF:	switch on rear panel
Cal Send:	Rear access wiring option
Access:	310 jacks standard with 5/8" spacing. Tip spring and Ring spring contacts for both level and oscillator inputs/outputs on back

MODEL 100A AISLE DISPLAY:

Power:	Uses -48 Vdc fed over cable connecting the 100-R to 100-A

Table 2-1 (Cont'd)

Current Drain:	180 mA nominal at -48 Vdc
Displays:	1" LED, displays
Cable Requirements:	12 Pair (24 Wires) unshielded
Distance:	Maximum distance 100-R to 100-A is 300 feet
Number of Units:	Up to 3 100-A units per one 100-R
Dimensions:	Overall, 11.5" X 9.5" X 2"

MODEL 100A-1 AISLE DISPLAY:

Power:	-48 Vdc external source fused at 1 amp
Current Drain:	200 mA nominal at -48 Vdc
Displays:	1" LED displays
Cable Requirements:	12 pair (24 Wires) unshielded 22 ga 2 pair (power) #16 or #18 solid copper
Distance:	Maximum distance 100R to 100A-1 or any combination multiple of runs is 1000 feet
Number of Units:	Up to twenty per one 100R
Dimensions:	Overall, 11.5" X 9.5" X 2"

INSTALLER PLEASE READ BEFORE PROCEEDING

1. All wiring detail is shown in Section 4 of the Installation Drawing package.

2. A separate job installation document should be provided for you by the Job Engineer/Customer showing equipment relay rack location, fusing, cable runs, wiring options, etc. in order to proceed with the installation.

3. Table 3.1 lists customer wiring options which are explained in more detail on page 7 par 3.12.

Table 3.1

WIRING OPTION	DESCRIPTION OF OPTION	REFERENCE LOCATION	PROVIDE	
			YES	NO
N, P (RCV / AUX) R, S (SEND / AUX)	Misc jack multiple	Section 4 Sheet 4		
H, J (monitor)	Audio monitor to high impedance speaker amp	Section 4 Sheet 4		
(X) E, F pins	DC loop holding for oscillator	Section 4 Sheet 4		
(Y)	Cal Pushbutton key (provided strapped from factory)	Section 4 Sheet 4	X	

SECTION 3

INSTALLATION AND OPERATION

3.01 This section contains information and instructions necessary for installation, interfacing and proper operation of the Model 100R and it's optional aisle display units Model 100A and Model 100A-1. Instructions include:

(a) receiving inspection
(b) mounting
(c) installer connections
(d) operational checks
(e) built in options

3.02 RECEIVING INSPECTION: Remove and inspect it for physical damage that may have resulted during transit. If the unit is damaged, file a claim with the transfer company. Original packaging should be retained to facilitate any damage claim.

3.03 If for any reason, the unit does not operate properly, call DESIGN DEVELOPMENT, INC., SUNNYVALE, CALIFORNIA, Telephone: (408) 734-2410.

3.04 MOUNTING: The Model 100R mounts in one rack space (1-3/4 inch vertical height) and is supplied with reversible rack mounting ears for either 19 or 23 inch mounting. The unit requires a rack depth of 9 inches. The aisle display units Model 100A or Model 100A-1 both may be mounted using a 5/8" threaded rod for overhead viewing. Both units top hanger assembly also can be used for wall mounting or from either side for bay mounting. See also the mechanical outline drawings of the Model 100R and large aisle display in the installation drawing section at the end of this manual for more detail.

3.05 INSTALLER CONNECTIONS: Input Model 100R power connections are made at the rear panel terminal screw block. The wire size and connections are shown in Fig. 1 at the end of this manual. It is recommended that the -48 VDC source be fused at 3 amp. The Model 100A and Model 100A-1 aisle display wiring is shown in Section 5 of this manual in detail.

3.06 INITIAL OPERATIONAL CHECK: Refer to Fig. 1. The Model 100R has six 10-turn potentiometers for setting the oscillator preset frequencies and levels.

CAUTION:

Before making any adjustments, allow a 2 to 3 hour warmup period for the circuits of the instrument to stabilize. Check and adjust the level and frequency settings as follows:

3.07 Patch from the SEND jack to the RCV jack with a standard telephone patchcord. Set the 600/900 toggle switch to 600. Select the 0 and the 600, TERM, and LEVEL pushbuttons.

INSTALLATION AND OPERATION (Cont'd)

3.08 Check that the LEVEL and frequency displays read 0.0 dBm and 1.004 kHz, respectively. If not, adjust the rear panel LEVEL 3 control for a readout of 0.0 dBm. Similarly, adjust the FREQ 2 control for a readout of 1.004 kHz.

3.09 Repeat the procedure for the 404 and 2804 Hz OSC FREQ pushbuttons, using the FREQ 3 and FREQ 1 controls, respectively.

3.10 Repeat the procedure for the -2 and -16 OSC LEVEL pushbuttons, using the LEVEL 2 and LEVEL 1 controls, respectively.

3.11 This completes the operational adjustments. The instrument should now perform as described in the performance specifications.

3.12 BUILT-IN OPTIONS.

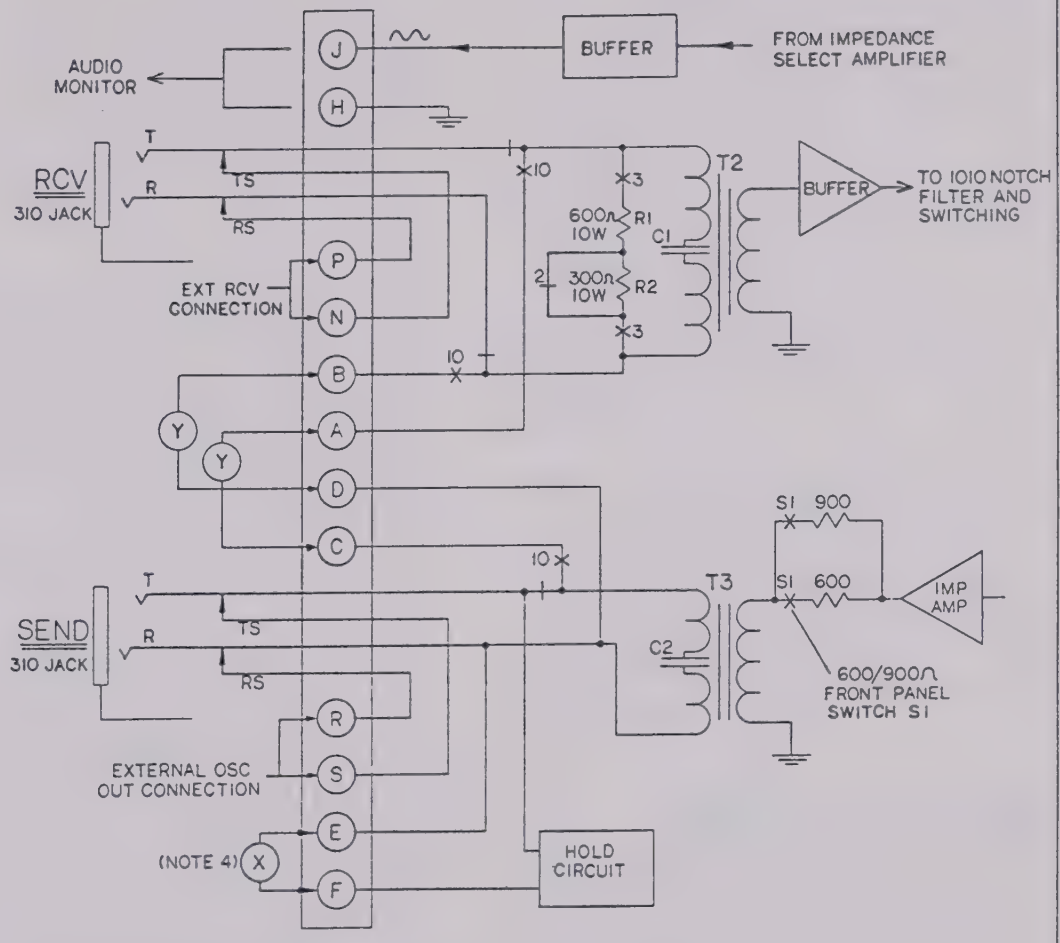
3.13 TEST BOARD AND MISC. JACK MULTIPLES: As an option, the tip-spring and the ring-spring of both the oscillator output and the level/noise input can be accessed through rear panel connector TS1. This is useful, for example, for operation of a testboard with a TMS or oscillator key connection. Refer to Fig. 3.1 for details.

3.14 AUDIO MONITOR: An audio monitor of the level or noise signal being measured is present at Pin J of connector TS1 (see Fig. 3.1). The output is an unbalanced 1000-ohm source impedance suitable for connection to a standard telephone speaker/amplifier input.

3.15 CAL PUSHBUTTON KEY: The CAL pushbutton enables a direct metallic connection to be made between the oscillator and the receiver input for the purpose of calibrating the oscillator output level. The level display provides an accurate readout of the oscillator level selected. Contacts of the CAL pushbutton are accessible through wirewrap pins on connector TS1. Normally, Pin A is strapped to Pin C, and Pin B to Pin D. The straps may be removed and the CAL feature re-routed for applications involving test boards that require level coordination.

3.16 REMOTE DISPLAY: Connector TS2 at the rear of the unit provides the output signals for operation of the Model 100A and Model 100A-1 remote displays (optional). Connections are made through standard wirewrap pins, except for the power block, which has screw terminals. The mounting bracket allows for overhead mounting using a standard 5/8 inch threaded rod, or rack mounting using the bracket on a right or left side mounting.

3.17 Fig. 3.1 provides a more detailed picutre of the input/output circuits of the Model 100R. The same information for connecting to the Model 100R is also shown in Fig. 1 Section 5.



NOTES

1. C1, C2 300VDC NON POLARIZED DC BLOCKING
2. R1, R2 = 10 WATTS
3. CONTACT LEGEND: 10 = CAL PUSHBUTTON
   2 = 900 OHMS BUTTON
   3 = TERM PUSHBUTTON
4. (X) OPTION STRAP E TO F TO PROVIDE OSC WITH DC LOOP HOLDING

INPUT/OUTPUT CIRCUITS FOR MODEL 100R T.T.S.		
12 20 80	155-2	

SECTION 4

THEORY AND CALIBRATION

4.01 This section contains the overall theory of operation and field calibration of the instrument. An overall description is presented first, at the block diagram level followed by the setting of the rear access calibration screwdriver controls.

4.02 SEND OSCILLATOR: The send oscillator signal is derived from an intergrating circuit. A capacitor in the integrating circuit is charged from a constant-current source to generate a linear ramp voltage. The voltage ramp is applied to a comparator, where it is compared to a positive reference voltage. When the two voltages are equal, the comparator reverses the current flow through the current source and discharges the intergrating capacitor. The cycle repeats and thus develops a triangular wave. The triangular wave is applied to a sine shaper circuit to generate a low distortion sine wave. The gain control amplifier, in conjunction with the front panel oscillator controls, provides pushbutton selectable preset levels (3), or a continuously variable output level. When the 1004 pushbutton is selected, a low pass filter is inserted in the output signal path to provide a low distortion sine wave tone that is free of second and higher order harmonics. The impedance amplifier following the gain control amplifier provides the correct gain for a 600 or 900 ohm impedance. When the 600 pushbutton is selected, the amplifier gain is increased to maintain the selected output level. From the impedance amplifier, the output signal is fed through the output transformer and CAL key contacts to the front panel SEND jack.

4.03 LEVEL/NOISE RECEIVE CIRCUITS: The level/noise receive circuits employ a balanced input stage for minimum noise pickup. The receive signal is coupled to the input circuit through a transformer that has balanced primary windings. A dc blocking capacitor protects the input circuit for voltages up to 300 VDC (bridging). In the terminated mode, an accurate 600 or 900 ohm resistor is bridged across the input to provide dc holding.

4.04 NOTCHED NOISE: The received noise signal is buffered and then applied to a notch filter. The notch filter is a 4-stage Butterworth type, which provides at least 50 dB of signal suppression from 995 Hz to 1025 Hz. The bandwidth at 3 dB down is 862 Hz to 1182 Hz.

4.05 RANGING AMPLIFIER AND AUTORANGING CIRCUITS: The automatic measuring circuit compresses to 60 dBm dynamic range of the input signal (+10 to -50 dBm) to the 30 dB range required by the log converter in the measuring circuit. Thus, ranging can be achieved with only two ranges, high and low.

4.06 NOISE FILTERS: Three noise weighting filters are built into the instrument. The filters are C message, 3 kHz flat, and 15 kHz flat. Also included is a 1010 Hz notch noise filter. The desired filter is selected by the front panel pushbutton switches.

THEORY AND CALIBRATION (Cont'd)

4.07 LEVEL AND NOISE DETECTOR: For level measurements, an average detector is used, while a quasi-rms detector is used for noise. For level or noise measurements, the input signal is applied to both an average and peak detector. The output from the peak detector is also applied to a summing amplifier through a transistor switch. When making noise measurements, the switch is closed so that it forms a quasi-rms detector.

4.08 LOG. A/D CONVERTER: The A/D converter receives the analog signal from the detector and converts it into a digital signal. The converter provides a resolution of 0.1 dB for level and 1 dB for noise.

4.09 FREQUENCY COUNTER: For frequency measurements, the input signal is applied to a sinewave to squarewave converter, the output of the converter is applied to a frequency X10 circuit. Both the input frequency, F_o and the frequency X10 signal are applied to the counter. An autoranging circuit also senses the signals applied to the counter. When the measured signal frequency is less than 10 kHz, the frequency X10 signal is applied to the counter and provides a 1 Hz resolution. When the input signal F_o is above 10 kHz, the counter switches to F_o and provides a 10 Hz resolution.

4.10 CALIBRATION:

4.11 The following paragraphs provide a complete set of adjustment procedures for the test set. These procedures can be used for periodic maintenance or if it is suspected that the instrument is off calibration as noted by comparison with other similar instruments. These procedures require precision laboratory equipment. Personnel performing these procedures must first be familiar with the test equipment specified.

4.12 Table 4-1 lists the equipment needed to calibrate the test set. If the recommended equipment is not available, use a substitute that can meet the requirements in Table 4-1.

TABLE 4-1. Test Equipment

EQUIPMENT	USE
Digital voltmeter HP 3490A	To monitor input level to TMS
Frequency Synthesized HP 3320B	To supply an accurate input level to TMS
Precision Resistors 900 ohms 0.01% 600 ohms 0.01%	To supply an accurate termination while setting up the oscillator 3320B

4.13 LEVEL CALIBRATION: There are 3 ten turn potentiometers on the rear of the Model 100R marked A, B and C. They are accessable by removing the rear cover plate over TS1.

4.14 Set up the test equipment as in Fig. 4.1 Setch A. Set the oscillator at 1 kHz and the level control so that the AC voltmeter reads .774596 volts.

4.15 Connect the oscillator to the RCV jack of the Model 100R TMS input as shown in Sketch B.

THEORY AND CALIBRATION (Cont'd)

CAUTION

Do not touch the oscillator output level after it is once set in Par 4.14.

4.16 Select 600 ohm, TERM, LEVEL pushbuttons on the Model 100R front panel.

4.17 The level display should now read ±0.0.

4.18 If adjustment is necessary adjust the "A" screwdriver pot until the ± sign is cycling back and forth and the level reads 0.0. The ± sign signifies a roundoff to the 1/100 dB. The 600 ohm position of the receiver input circuit is now calibrated.

4.19 Set up the test equipment as per Fig. 4.1 Sketch C. Set the oscillator at 1 kHz and the level control so that the AC voltmeter reads .948683 volts.

4.20 Connect the oscillator to the Model 100R per Sketch D being careful not to disturb the output level setting.

4.21 Select 900 ohm, TERM, LEVEL pushbuttons on the Model 100R front panel.

4.22 The level display should now read ±0.0.

4.23 If adjustment is necessary adjust the "C" screwdriver pot until the ± sign is cycling back and forth and the level reads 0.0. The ± sign signifies a roundoff to the 1/100 dB. The 900 ohm position of the receiver input circuit is now calibrated.

4.24 NOISE CALIBRATION: Before proceeding with the noise calibration make sure the receiver has been calibrated per paragraphs 4.13 through 4.17 or the receiver is in good working calibrated condition.

4.25 Patch from the SEND to the RCV jack using a standard 310 patch cord.

4.26 Set the Model 100R controls as follows:

Oscillator 600 ohms, osc level on VAR, osc frequency on 1004

Receiver 600 ohms, TERM, LEVEL.

4.27 Set the VAR oscillator level control until the display reads -39.6 dB.

4.28 Select the 3 kHz pushbutton and read the noise in dBrn.

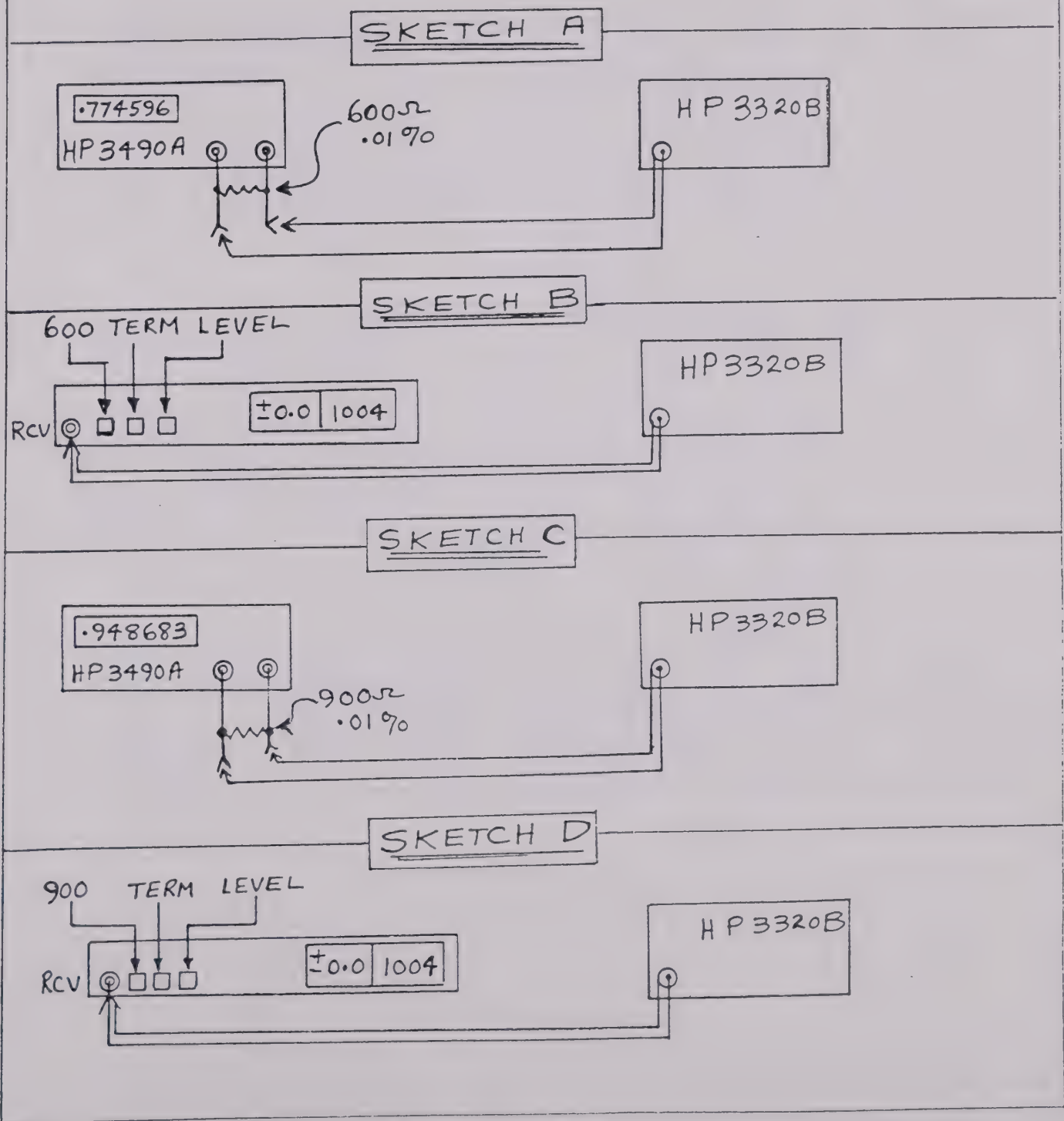
4.29 Display should read +50. If not adjust "B" screwdriver pot below TS-1 until the display just changes from 51 to 50 dBrn.

4.30 Select LEVEL once more and set the oscillator VAR output control until the reading is -40.0 dBm.

4.31 Select the 3 kHz position once more and the display should read 50 dBrn. The receiver noise section is now calibrated. The 900 ohm impedance should also give the same results when both the oscillator output and 100R input are selected to 900 ohm positions.

FIGURE 4.1

CALIBRATION TEST SETUP



SHEET INDEX											
CONTENTS	SHEET NO.	ISSUE NO. 1	2	3	4	5	6	7	8	9	10
INDEX AND SUPPORTING INFORMATION	1	X									
BLOCK SCHEMATIC	2		X								
CABLE APPARATUS DRAWING	3		X								
MAIN TRANSMISSION UNIT CAD-1 (FIG. 1)	4			X							
100A AISLE DISPLAY CAD-2 (FIG. 2)	5		X								
100A-1 AISLE DISPLAY CAD-3, CAD-4	6		X								
MODEL 100R OUTLINE DRAWING	7				X						
MODEL 100A, 100A-1 OUTLINE DRAWING	8	X									

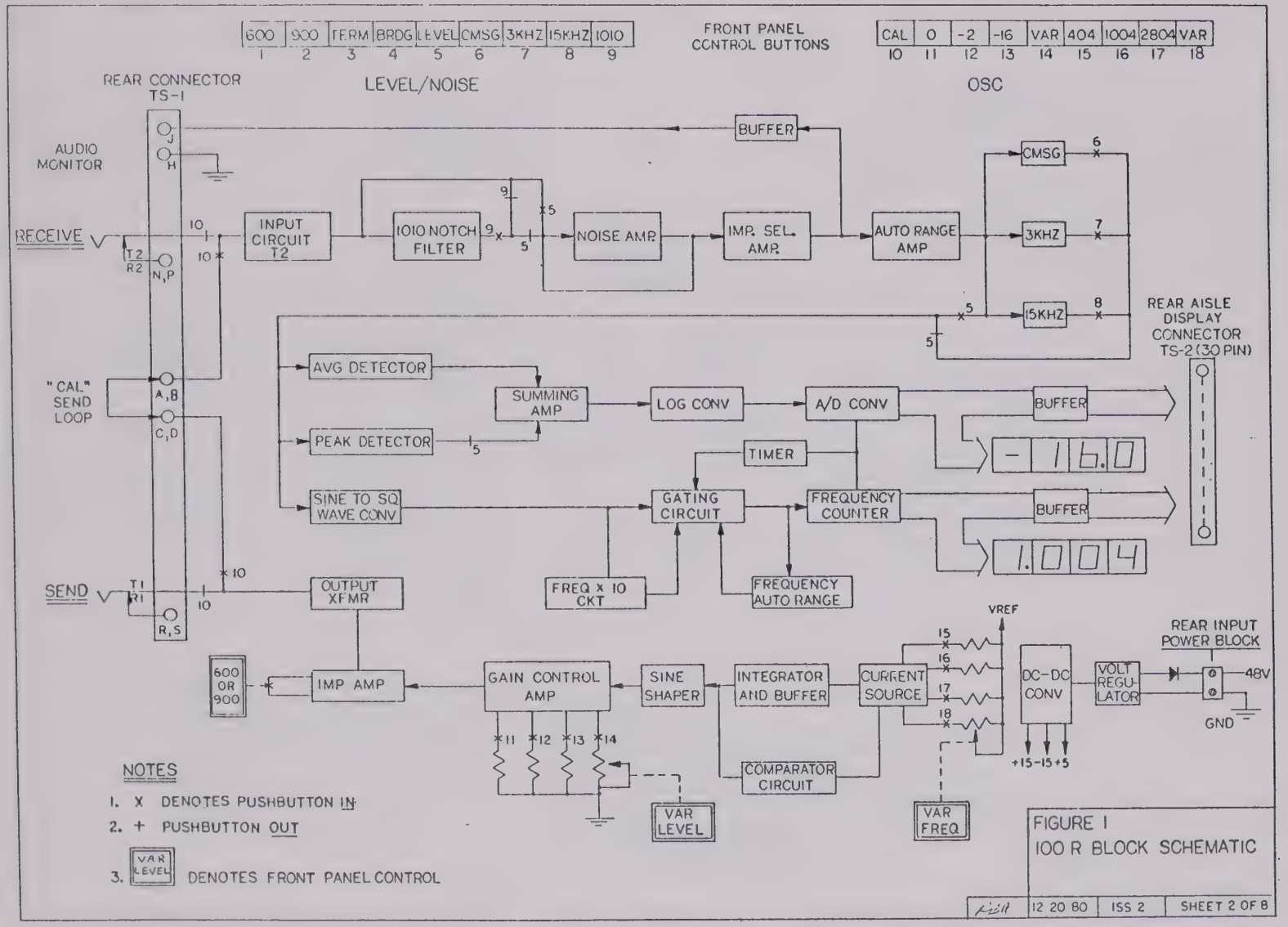
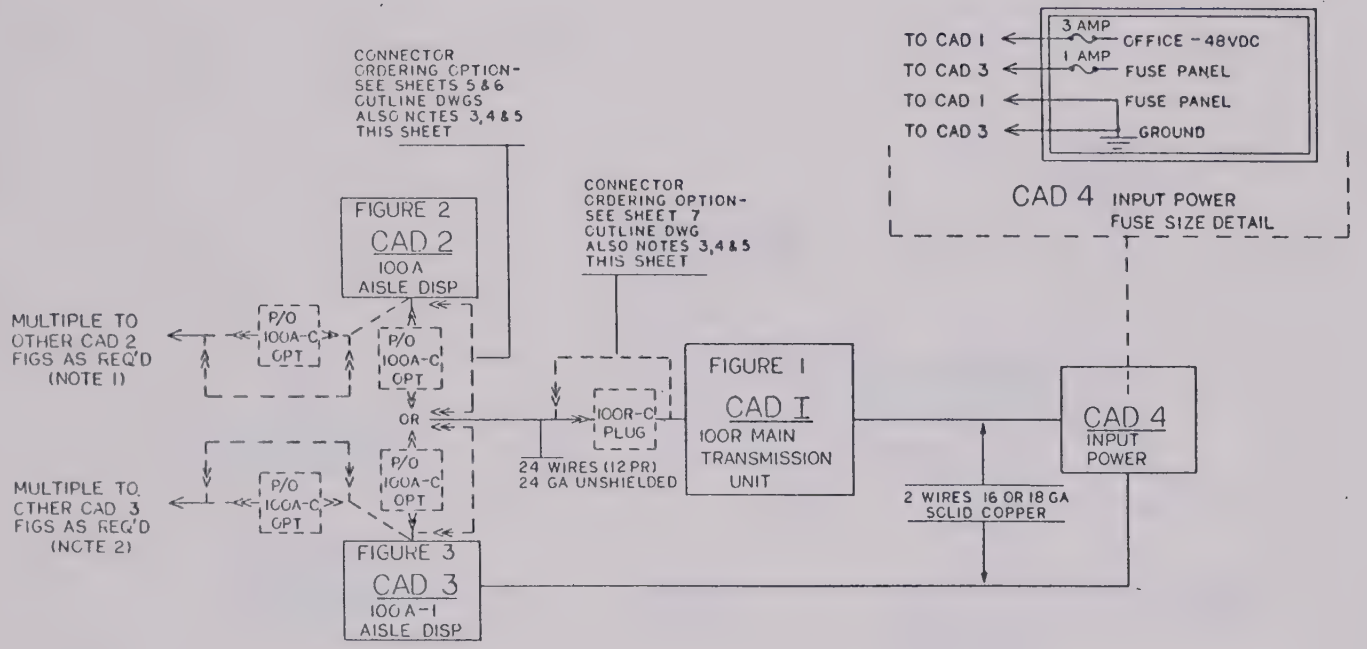


FIGURE 1
100 R BLOCK SCHEMATIC

fill	12 20 80	ISS 2	SHEET 2 OF 8



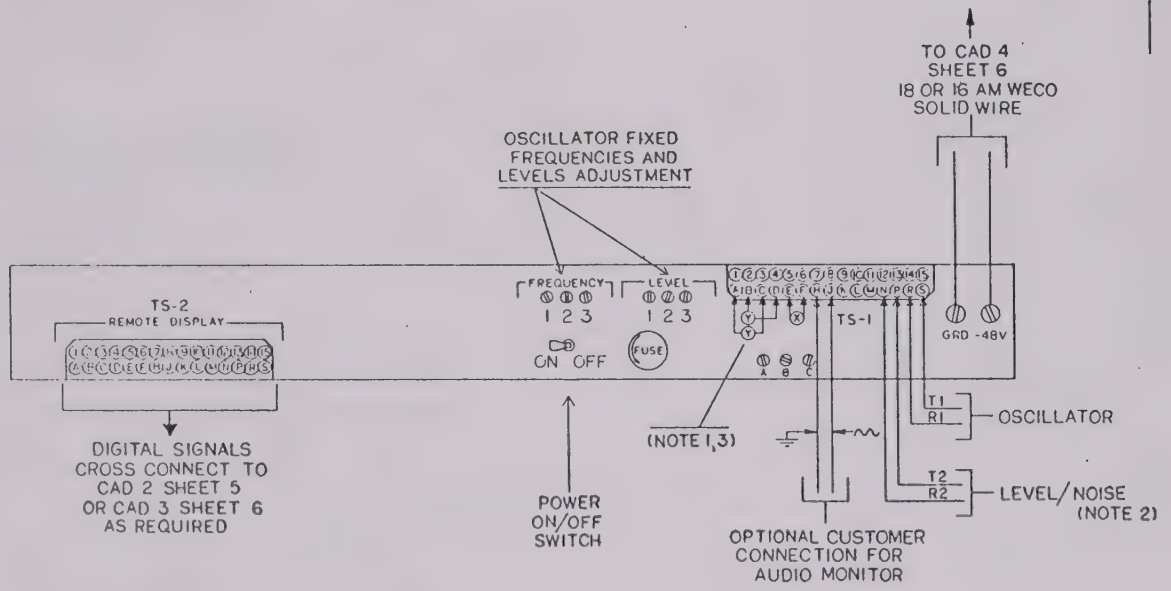
NOTES:

1. CABLING CAD 1 TO CAD 2 NOT TO EXCEED 300 FT. NO MORE THAN 3 EA CAD 2 FIGS TOTAL.
2. CABLING CAD 1 TO CAD 3 NOT TO EXCEED 1000 FT. NO MORE THAN 20 EA CAD 3 FIGS TOTAL.
3. ORDERING OPTION
   A. MODEL 100R-C CHAMP CONNECTOR MALE PLUG FOR 100R
   B. MODEL 100A-C DBL CONNECTOR MALE/FEMALE FOR 100A(A1)
4. BOTH MODELS 100R-C AND 100A-C MATE WITH WESTERN ELECTRIC B25A CABLE PLUG SERIES. THIS SERIES USES KS-16689L-1 MALE AND KS-16690L-10 FEMALE CONNECTORS.
5. MODEL 100R-C = CHAMP CONNECTOR, 1 EA, P/N 552116-1 MALE
   MODEL 100A-C = CHAMP CONNECTOR, 2 EA;
   1 EA P/N 552116-1 MALE
   1 EA P/N 552118-1 FEMALE

CABLE APPARATUS DRAWING
OVERALL SYSTEM

	12-20-80	ISS 2	SHEET 3 OF 8

CAD 1
FIGURE 1



NOTES

1. STRAP PIN A TO C AND B TO D TO MAKE USE OF FRONT PANEL "CAL" PUSHBUTTON. (Y WIRING OPTION)
2. T1, R1 AND T2, R2 ARE OPTIONAL CUSTOMER CONNECTIONS TO THE INPUT METER CIRCUIT AND ALSO OSCILLATOR SENDING. THEY REPRESENT THE TIP SPRING AND RING SPRING CONTACTS OF THE FRONT PANEL ACCESS JACKS.
3. STRAP E TO F TO PROVIDE OSCILLATOR WITH DC LOOP HOLDING CIRCUIT. (X WIRING OPTION)

MAIN TRANSMISSION UNIT
REAR VIEW CONNECTIONS
FIGURE 1

	12-20-80	ISS 3	SHEET 4 OF 8

CAD 2

FIGURE 3

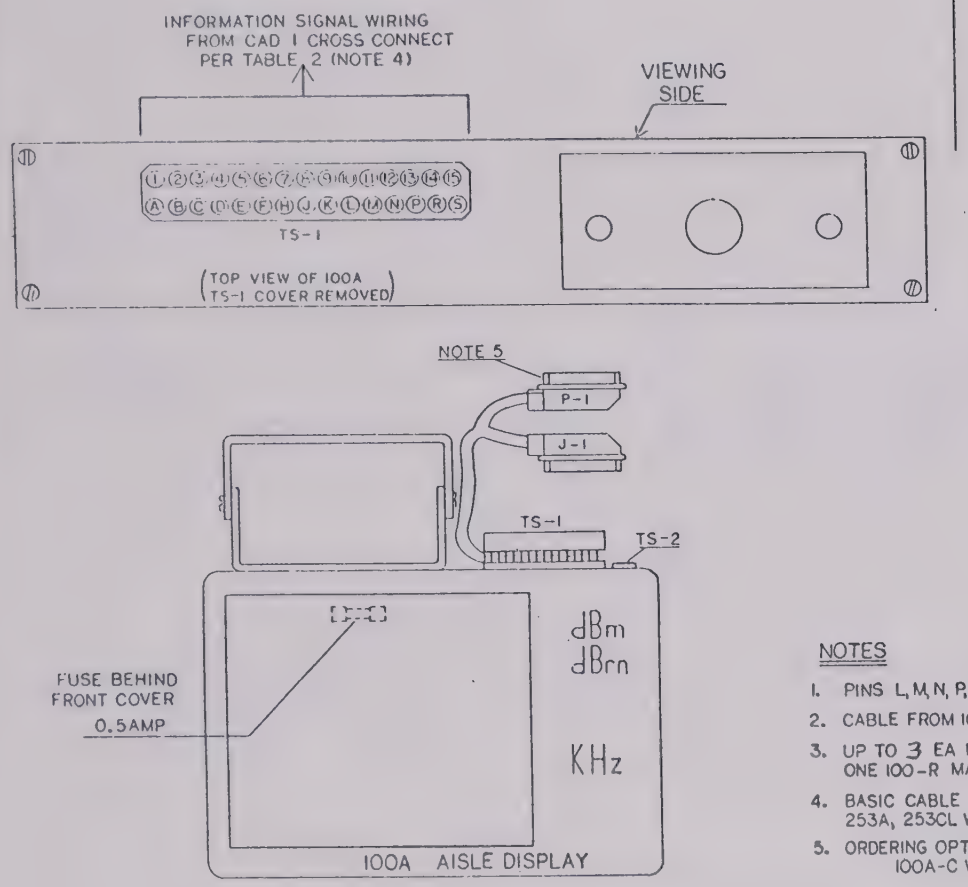


TABLE 2 - CABLING 100A-1 TO 100-R (NOTES 1, 2)

FROM 100A TS-1 PIN:		TO 100-R TS-2 PIN:	INFORMATION SIGNAL
1		1	D2
2		2	D3
3		3	G
4		4	d
5		5	e
6		6	f
7		7	B4
8		8	B3
9		9	b
10		10	FREQ DECIMAL RES
11		11	BLANKING
12		12	DI
13		13	DIGITAL GND
14		14	-48VDC
15		15	GND
A		A	C4
B		B	B1
C		C	B2
D		D	C3
E		E	C2
F		F	C1
H		H	SIGN
J		J	C
K		K	a

NOTES

1. PINS L, M, N, P, R, S ARE NOT CONNECTED
2. CABLE FROM 100A-1 TO 100-R NOT TO EXCEED 300 FEET
3. UP TO 3 EA 100A AISLE DISPLAYS MAY BE CABLED FROM ONE 100-R MAIN UNIT
4. BASIC CABLE REQUIREMENTS – 12 PAIR, 24 GAUGE UNSHIELDED 253A, 253CL WECO OR GT-17 12 PR AUTOMATIC ELECTRIC
5. ORDERING OPTION– 100A-C WIRED CONNECTOR

FIGURE 3
CABLING FROM 100A TO 100-R TMS

	12-20-80	ISS 2	SHEET 5 OF 8

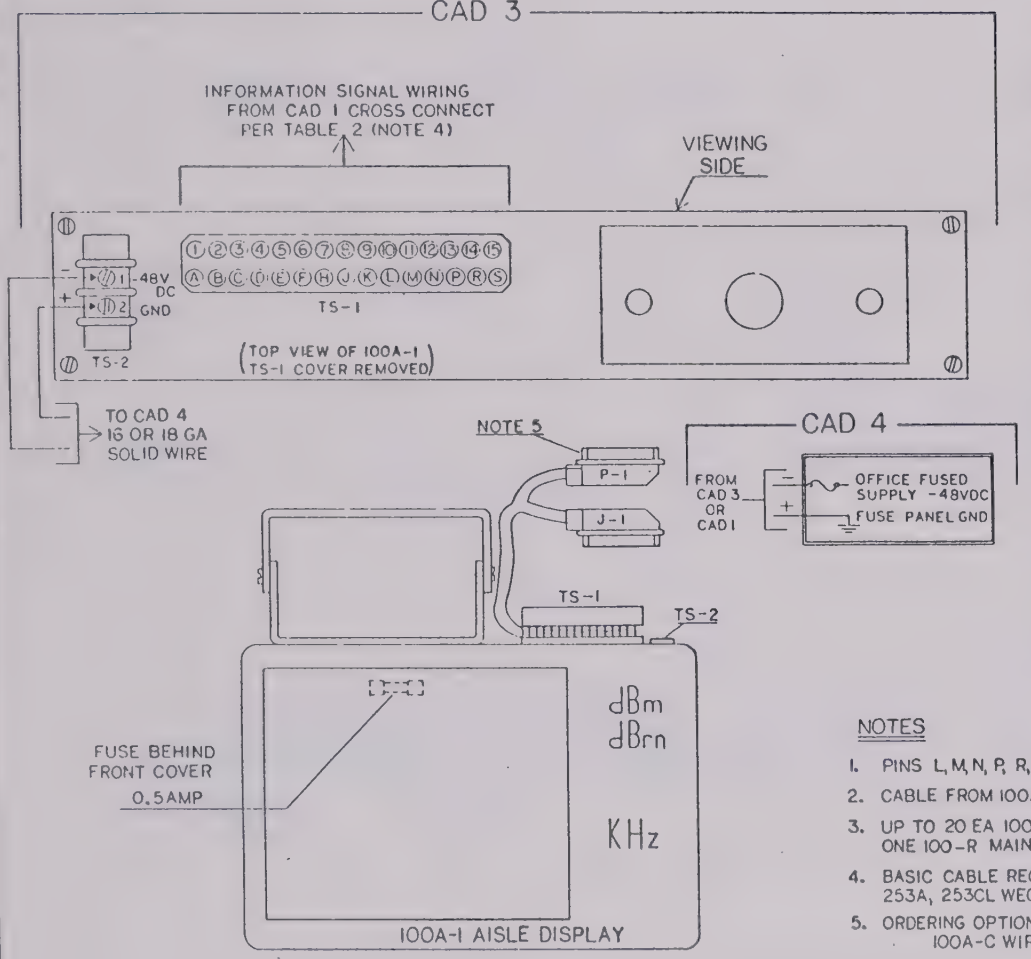


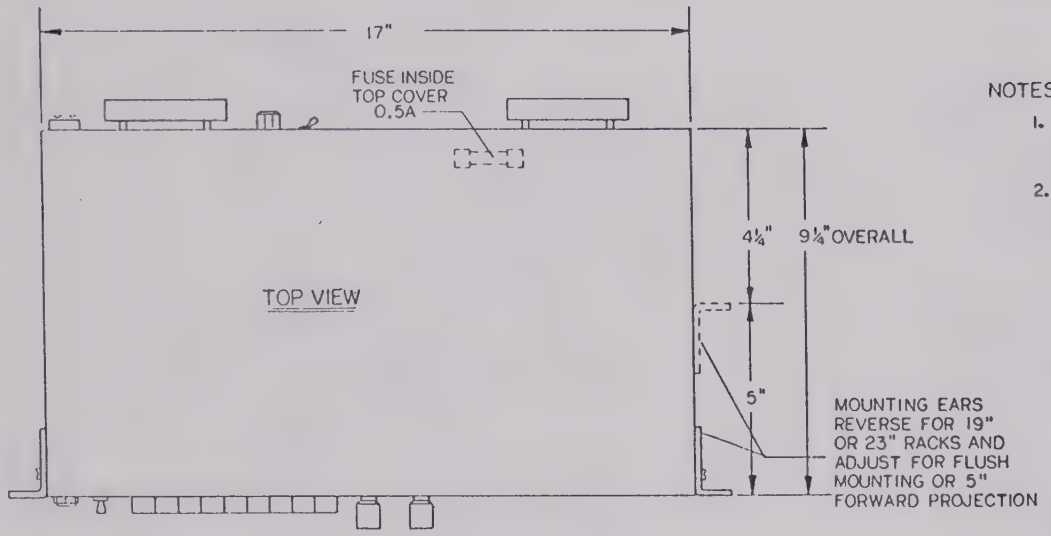
TABLE 2 - CABLING 100A-1 TO 100-R (NOTES 1, 2)

FROM 100A-1 PIN: TS-1	FROM 100A-1 PIN: TS-2	TO 100-R PIN: TS-2	INFORMATION SIGNAL
1		1	D2
2		2	D3
3		3	G
4		4	d
5		5	e
6		6	f
7		7	B4
8		8	B3
9		9	b
10		10	FREQ DECIMAL RES
11		11	BLANKING
12		12	D1
13		13	DIGITAL GND
14		14	-48VDC
15		15	GND
A		A	C4
B		B	B1
C		C	B2
D		D	C3
E		E	C2
F		F	C1
H		H	SIGN
J		J	c
K		K	a
	1	OFFICE FUSED -48VDC	
	2	OFFICE FUSE PANEL GROUND	

NOTES

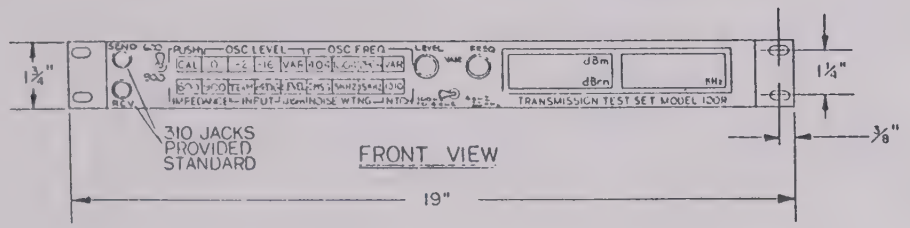
1. PINS L, M, N, P, R, S ARE NOT CONNECTED
2. CABLE FROM 100A-1 TO 100-R NOT TO EXCEED 1000 FEET
3. UP TO 20 EA 100A-1 AISLE DISPLAYS MAY BE CABLED FROM ONE 100-R MAIN UNIT
4. BASIC CABLE REQUIREMENTS – 12 PAIR, 24 GAUGE UNSHIELDED 253A, 253CL WECO OR GT-17 12 PR AUTOMATIC ELECTRIC
5. ORDERING OPTION– 100A-C WIRED CONNECTOR

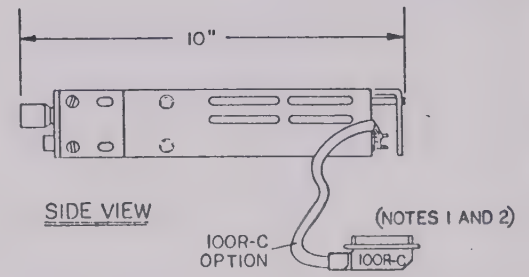
FIGURE 4
CABLING FROM 100A-1 TO 100-R TMS


17"
FUSE INSIDE TOP COVER 0.5A
TOP VIEW
4¼"
9¼" OVERALL
5"
MOUNTING EARS REVERSE FOR 19" OR 23" RACKS AND ADJUST FOR FLUSH MOUNTING OR 5" FORWARD PROJECTION

NOTES

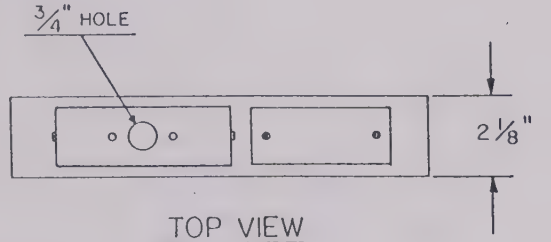
1. CHAMP CONNECTOR MALE PLUG P/N 552116-1 ORDERING OPTION. SPECIFY 100R-C
2. CONNECTOR CABLE B25 IS AVAILABLE FROM WESTERN ELECTRIC IN VARIOUS LENGTHS FROM 8' TO 390'. THE B25A CABLE CONNECTOR HAS A KS-16689L-1 PLUG (MALE) ON ONE END AND A KS-16690L 10 CONNECTOR (FEMALE) ON THE OTHER END





MODEL 100R OUTLINE DRAWING

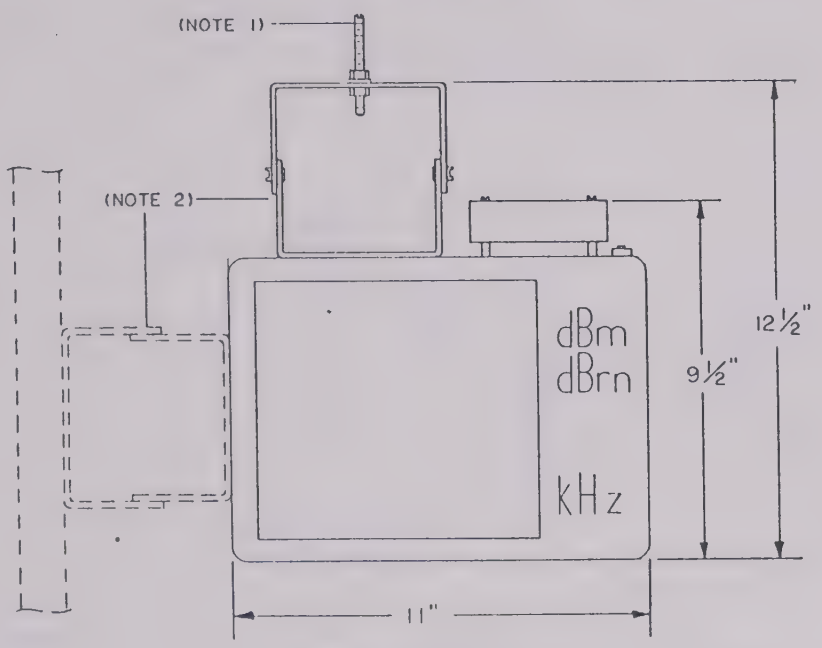
	12 20 80	155 4	SHEET 7 OF 8



TOP VIEW

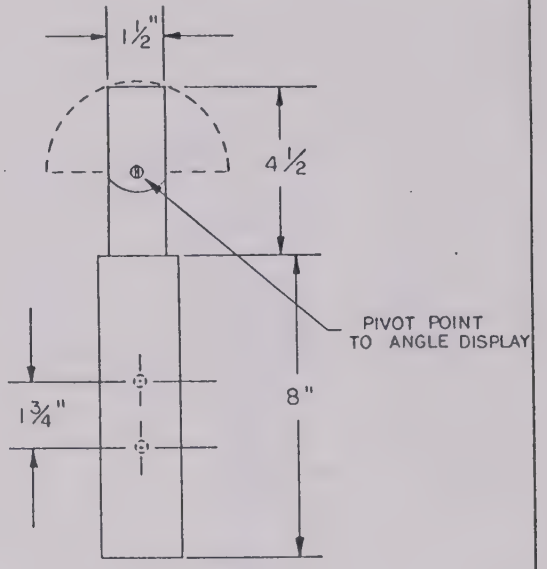
NOTES

1. THREADED ROD CUSTOMER FURNISHED
2. UNIT SHOWN WITH TOP MOUNTED HANGER ASSEMBLY. UNIT CAN BE MOUNTED FROM TOP OR EITHER SIDE OR WALL MTD.



FRONT VIEW

(100A, 100A-1, 100A-2, 100A2W)

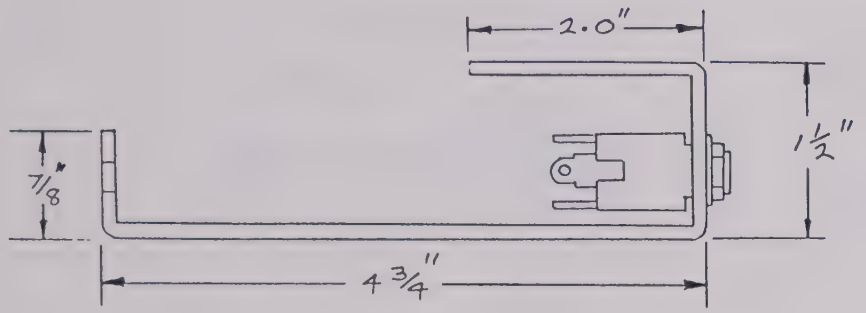


SIDE VIEW

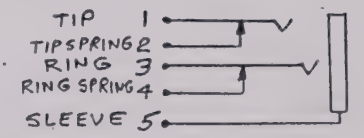
MODEL 100A/A1/A2
OUTLINE DRAWING

RBa	12 20 80	ISS-1	SHEET 8 OF 8

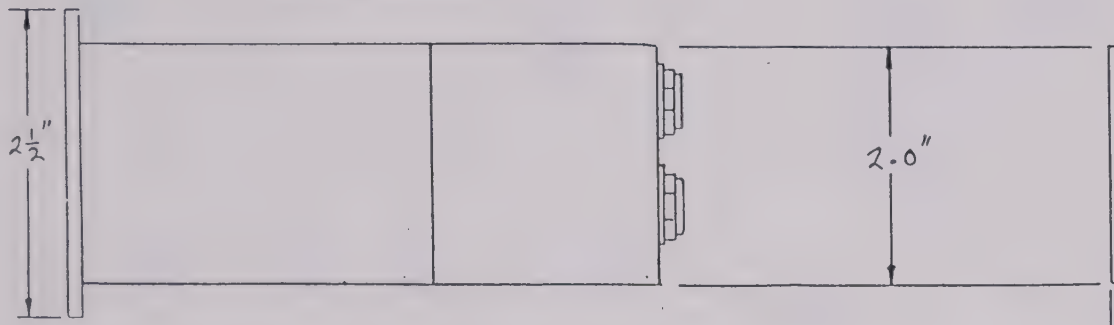
BOTTOM VIEW



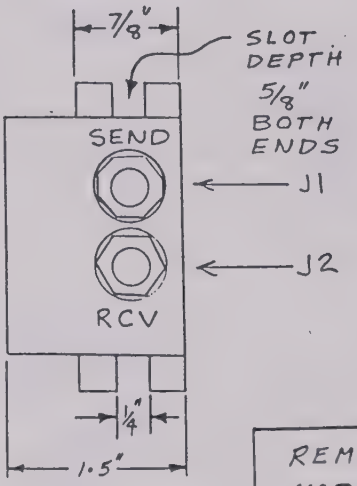
J1-J2 SCHEMATIC



SIDE VIEW



FRONT VIEW

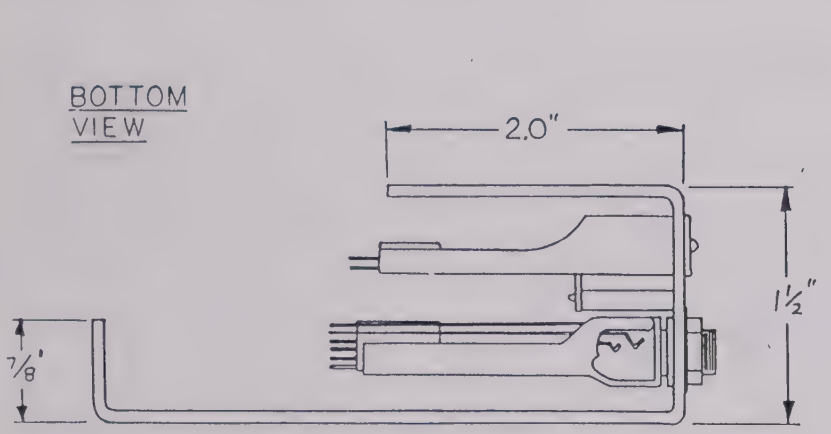


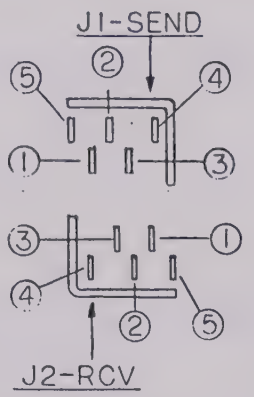
NOTES:

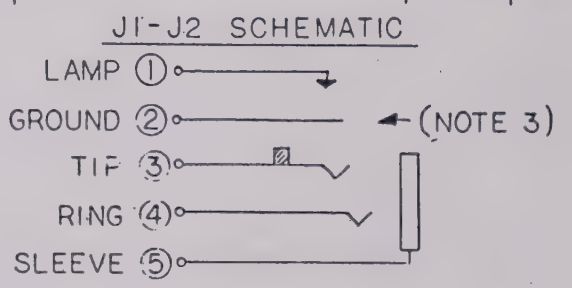
1. CABLING FROM 100 AB-1 TO TTS UNITS NOT TO EXCEED 100 FEET ANY SINGLE OR MULTIPLE RUN
2. FOR USE WITH MODELS 100R, 100R-1, 100R-2W, 110R

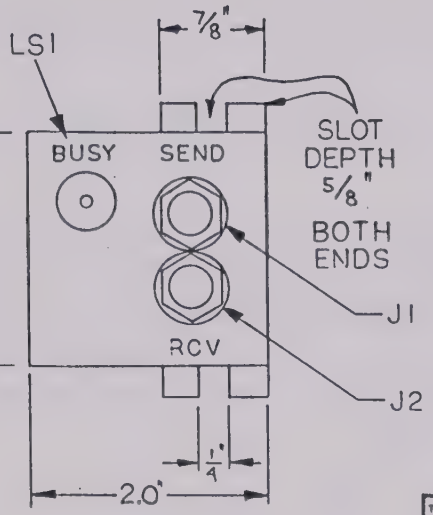
REMOTE BRACKET MODEL 100 AB-1 NOTE 2.		
4-17-79	DESIGN DEVELOPMENT	SHEET 8A

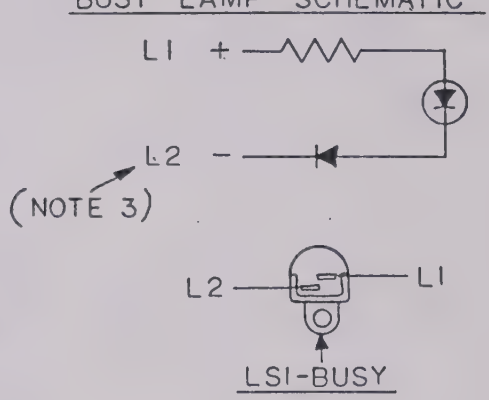
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED











NOTES:

1. CABLING FROM 100AB3 TO TTS UNITS NOT TO EXCEED 100 FEET ANY SINGLE OR MULTIPLE RUN.
2. FOR USE WITH MODELS 100R, 100R-1, 100R-2W & 110R.
3. CONNECT J1, PIN 2 TO OFFICE GROUND AND L2 (LAMP) TO FUSED -48VDC.

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS ± DEC ± ANGLES ±		DESIGN DEVELOPMENT INC		
APPROVALS	DATE	MODEL 100AB3 REMOTE BRACKET OUTLINE		
DRAWN TWB	7/28/81			
CHECKED		SCALE NONE	SIZE B	DRAWING NO. 100AB3
		DO NOT SCALE DRAWING		SHEET 8B

BISHOP GRAPHICS INC

TABLE 3-CABLING 100R SERIES TO 100A SERIES USING CABLED SYSTEM

FROM		TO		INFORMATION SIGNAL
100A TS-1 PIN:	100A-C PIN: P-1 & J-1	100R TS-2 PIN:	100R-C PIN:	
1	1	1	1	D2
2	26	2	26	D3
3	2	2	2	G
4	27	27	27	d
5	3	3	3	e
6	28	28	28	f
7	4	4	4	B4
8	29	29	29	B3
9	5	5	5	b
10	30	30	30	FREQ. DECIMAL RES.
11	6	6	6	BLANKING
12	31	31	31	D1
13	7	7	7	DIGITAL GND
14	32	32	32	-48VDC
15	8	8	8	GND
A	33	33	33	C4
B	9	9	9	B1
C	34	34	34	B2
D	10	10	10	C3
E	35	35	35	C2
F	11	11	11	C1
H	36	36	36	SIGN
J	12	12	12	C
K	37	37	37	a

TABLE 3
CABLING FROM 100A TO 100R USING CABLED FACTORY WIRE SYSTEM

MODEL 100R CALIBRATION PROCEDURE

VISUAL INSPECTION

6.0 Inspect the 100R carefully. Check if components are missing and solder bridges. Check all capacitors,diodes,and I.C.'s are loaded in the right manner.

6.1 Set DVM to K ohm,check the collectors of all TIPS and voltage regulators are not shorted to the heat sink.

INITIAL TURN-ON

6.2 Mid-range all pots.

6.3 Set 100R receiver to 600 ohm, TERM, and LEVEL. Oscillator to 600 ohm,VAR LEVEL,VAR FREQUENCY,FREQUENCY SWITCH to (100 HZ to 4 kHz.)

6.4 Set scope time base to 10 us/DIV,vertical input to 20V/DIV,trigger to channel 1,DC and AUTO.

6.5 Connect scope to collector of Q3 and common.

6.6 Turn power switch on,observe a clean squarewave of 80VP to P,20 kHz appears on the scope. The TMS should draw less than 180 mA,and display should indicate a minus sign and blanked. Note: if squarewave is not clean or TMS draws more than 180 mA,check emitter of Q2 to be -40 to -39 V. Increase of decrease R2 and R3 if necessary.

6.7a Check +15V power supply to be +15V ±0.5V
b Check -15V power supply to be -15V ±0.5V
c Check +5V power supply to be +5V ±0.3V

OSCILLATOR CHECK

6.8 Connect the equipment as follows:

6.9 Set 100R oscillator to 600 ohm,VAR FREQ.,VAR LEVEL and 100R standard receiver to 600 ohm,TERM,LEVEL.

6.10 Adjust VAR FREQ. control all way counter-clockwise,select lo-band (100Hz-4000Hz),and adjust R322 (Lo Freq. adjust) to read 92 Hz.

6.11 Adjust VAR FREQ. control clockwise,the frequency should read 4200 to 4500 Hz.

MODEL 100R CALIBRATION PROCEDURE (cont'd)

6.12 Switch to Hi band,check frequency can vary from below 4000 Hz to above 20,000 Hz.

6.13 Select 404 Hz,and adjust R403 to read 404 ±1 Hz.

6.14 Repeat step 6.13 for 1004 and 2804 by R402 and 401.

6.15 Select 1004 Hz,and adjust VAR LEVEL to read ±0.0 dBm select CMSG,1010 NOTCH on the standard.

6.16 Adjust R371,R346 (distortion) and R334 (symmetry) to obtain a reading of 31 or lower.

6.17 Select 15 KC,the meter should read 40 or lower.

6.18 Set standard to LEVEL,adjust VAR LEVEL all the way counter-clockwise,adjust R381 to read -40.2 dBm. Adjust VAR LEVEL counter-clockwise,the level should read above +10.0 dBm.

6.19 Select 0.0 dBm,and adjust R375 to read ±0.0.

6.20 Repeat step 6.19 for -2.0 and -16.0 by adjusting R376 and R377.

6.21 Select 900 ohm on both 100R oscillator and standard receiver. Set 100R to 0.0 dBm, adjust R384 to read ±0.0

6.22 Set both units back to 600 ohm position,slowly sweep the frequency from 100 Hz to 20,000 Hz; observe the level should be within ±0.1 dBm.

6.23 Seal all pots.

RECEIVER LEVEL CALIBRATION

6.24 Connect the equipment as follows:

Note that 100R analog ground is connected to chassis ground.

6.25 Set attenuator to 0.0,100R receiver to 600 ohm,TERM LEVEL and standard oscillator to 600 ohm,VAR LEVEL,and 1004 Hz.

6.26 Monitor the DC voltage across C55 with a DVM,adjust VAR LEVEL to read 6.000 ±0.003V (adjust R103 if necessary). Check pin 6 of u8 with a scope,observe that there is no high freq. oscillation.

6.27 Set attenuator to 30 dB,adjust R106 to read 0.189 ±0.001V. Repeat steps 6.26 and 6.27 for proper tracking.

MODEL 100R CALIBRATION PROCEDURE (cont'd)

6.28 Increase VAR LEVEL to obtain +10.0 dBm,adjust R103 if necessary.

6.29 Set attenuator to 20,adjust R165 to read -10.0. Repeat steps 6.28 and 6.27 for proper tracking.

6.30 Set attenuator to 33,adjust R112 to read -23.0. Repeat steps 6.28,6.29 and 6.30 for proper tracking.

6.31 Set the meter to read ±0.0,check tracking to -50.0 dBm.

6.32 Connect the REF Generator 600 ohm output to 100R, mid-range R123,adjust R103 to read ±0.0.

6.33 Select 900 ohm,and apply 900 ohm output of the REF Generator to the meter,adjust R60 to read ±0.0.

RECEIVER NOISE CALIBRATION

6.34 Select 600 ohm,TERM,and 3 KC apply 1004,-30.5 dBm to the meter.

6.35 Adjust R56 so the readout start to change from 60 to 59.

6.36 Increase the level to -30.0 dBm,check CMSG and 15 KC to read 60.

6.37 Select CMSG,and switch frequency to 404 and 2804,the meter should read 49 ±1,and 58 ±1.

6.38 Select 3 KC,and frequency to 3000 Hz,the meter should read 57 ±1.

6.39 Select 15 KC,and frequency to 15000 Hz,the meter should read 57 ±1.

6.40 Check tracking from 60 to 0 for all 3 filters.

1010 NOTCH NOISE CALIBRATION

6.41 Select 600 ohm,TERM,CMSG,and 1010 NOTCH,apply 1004 and 0.0 dBm to the meter,adjust R25 and R37 for the lowest reading (about 30) on the meter.

6.42 Set level to 0.0 dBm,2804. Adjust R18 so the output of pin 12 of U5 to be the same as pin 6 of U1.

6.43 Set level to -30.0 dBm,862 Hz,select 15 KHz and 1010 Notch,adjust R14 to read 57 or 58.

6.44 Increase frequency to 1182,adjust R47 to read 57 or 58.

MODEL 100R CALIBRATION PROCEDURE (cont'd)

6.45 Repeat steps 6.43 and 6.44. If adjusting R14 and R47 cannot obtain the proper reading,repeat steps 6.41,6.39 and 6.44.

BLANKING ADJUSTMENT

6.46 Select 600 ohm,TERM,LEVEL,and apply +10.1 dBm,1004 to the meter. Adjust R172 so the meter is blanked except the plus sign.

6.47 Decrease the level to -23.0 dBm,adjust R175 so the 100R under ranges to the low range.

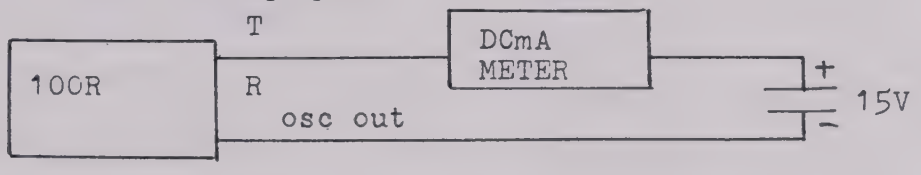
6.48 Decrease level to -50.1 dBm,adjust R178 so the meter is blanked except the minus sign.

AUDIO MONITOR CHECK

6.49 Apply 1004,and 0.0 dBm to the meter. Check emitter of Q4 for clean sinewave.

HOLDING CIRCUIT CHECK

6.50 Connect the equipment as follows:



6.51 Observe the DCmA meter indicates no current flow.

6.52 Using a jumper,connect pins E and F on the oscillator board,the DCmA meter should indicate about 30 mA.

FREQUENCY RESPONSE CHECK

6.53 Using 100R standard,sweep the frequency from 100 to 20000 Hz set level at +9.0,±0.0 and -23.5 dBm. Observe the meter should not change more than 0.1 dB.

6.54 Repeat step 6.53 except with 100R oscillator feed into the 100R standard.

6.55 Seal all pots.

LONGITUDINAL BALANCE CHECK

6.56 Set 100R oscillator to 600 ohm,0 dBm,1004,and receiver to 600 ohm,TERM,15 kHz,1010 notch,add C* to oscillator T or R output until meter shows minus blanking.

SERIAL NO._____

MODEL 100R TEST RECORD

6.0	VISUAL INSPECTION	_____
6.1	NO SHORT	_____
6.6	SQUAREWAVE CHECK	_____
6.7	+15V	_____
	-15V	_____
	+ 5V	_____
6.10	LO FREQ. ADJUST	_____
6.11	FREQ. RANGE CHECK	_____
6.13	404 ADJ	_____
6.14	1004 ADJ	_____
	2804 ADJ	_____
6.16	DISTORTION (1004)	_____
6.18	OUTPUT LEVEL ADJ	_____
6.19	PRESET LEVEL ADJ	_____
6.21	900 ohm OUTPUT ADJ	_____
6.22	FREQ. RESPONSE CHECK	_____
6.27	30 DB TRACKING ADJ	_____
6.29	PROPER TRACKING ADJ	_____
6.31	50 dB ATTENUATION CHECK	_____
6.32	ZERO REFERENCE ADJ (600 ohm)	_____
6.33	ZERO REFERENCE ADJ (900 ohm)	_____
6.34	NOISE-CAL ADJ	_____
6.37	CMSG FREQ. RESPONSE	_____

MODEL 100R TEST RECORD

6.38	3 KC FREQ. RESPONSE	_____
6.39	15 KC FREQ. RESPONSE	_____
6.40	FILTER TRACKING CHECK	_____
6.41	NOTCH ATTENUATION ADJ (50 dB)	_____
6.44	3 dB POINT ADJ	_____
6.46	OVER-RANGE BLANKING ADJ	_____
6.47	UNDER-RANGE ADJ	_____
6.48	MINUS BLANKING ADJ	_____
6.49	AUDIO MONITOR CHECK	_____
6.50	HOLD CKT CHECK	_____
6.53	FREQ. RESPONSE CHECK	_____
6.56	LONGITUDINAL BALANCE CHECK	_____

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